

Application No. 10/645,641
Attorney Docket No.: 14123-17
December 29, 2004

AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions and listings of claims in the present invention:

1. (Currently Amended) A low temperature cofired ceramic-metal (LTCC-M) integrated ~~circulator~~ non-reciprocal device for directing radio frequency (RF) signals, comprising:

at least one ferrite disk situated in a magnetic field caused by at least one magnet and a ferrous base plate acting as a magnetic return path;

a conductor junction having ~~[[3]]~~ three ports for coupling the ~~radio frequency RF~~ signals to the ~~circulator~~ non-reciprocal device; and

a plurality of LTCC-M insulating layers for positioning the at least one magnet~~[[,]]~~ and the at least one ferrite disk, and to support the conductor junction.

2. (Currently Amended) The ~~circulator~~ non-reciprocal device of claim 1, wherein the conductor junction forms a micro-strip transmission line for coupling the RF signals to the ~~circulator~~ non-reciprocal device.

3. (Currently Amended) The ~~circulator~~ non-reciprocal device of claim 1, wherein the conductor junction forms a stripline transmission line for coupling the RF signals to the ~~circulator~~ non-reciprocal device.

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4. (Withdrawn) The ~~circulator~~ non-reciprocal device of claim 1, further comprising ferrite filled vias to improve the closure of the magnetic field.

5. (Withdrawn) The ~~circulator~~ non-reciprocal device of claim 1, further comprising isolated terminals on the base plate and metal vias used to electrically couple the conductor junction to a printed circuit board (PCB).

6. (Withdrawn) The ~~circulator~~ non-reciprocal device of claim 5, wherein the ~~circulator~~ non-reciprocal device is affixed to and electrically coupled to the PCB by surface mount technology (SMT).

7. (Currently Amended) The ~~circulator~~ non-reciprocal device of claim 1, further comprising a resistive termination configured such that the ~~composite~~ device acts as an isolator.

8. (Withdrawn) The ~~circulator~~ non-reciprocal device of claim 7, wherein the resistive termination is electrically coupled to the conductor junction by metal vias.

9. (Withdrawn) The ~~circulator~~ non-reciprocal device of claim 7, wherein the resistive termination is thermally coupled to the base plate by thermal vias to remove heat dissipated by the termination.

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10. (Currently Amended) The ~~circulator~~ non-reciprocal device of claim 1, wherein the ~~circulator~~ non-reciprocal device is hermetically sealed by ~~[[the]]~~ an LTCC-M package.

11. (Withdrawn) A method of making an LTCC-M ~~circulator~~ non-reciprocal device, comprising the steps of:
providing one or more green sheets of insulating ceramic;
providing at least one magnet and a ferrous base plate;
providing a contact junction;
stacking the sheets so that there is at least one insulating ceramic sheet between the magnet and ~~[[the]]~~ a ferrite disk to form a stacked assembly; and
cofiring the stacked assembly to form an integrated LTCC-M ~~circulator~~ non-reciprocal device.

12. (Withdrawn) The method of claim 11,
wherein the step of providing one or more green sheets ~~comprises~~ includes providing green sheets ~~comprising~~ comprised of glass compositions and optional ceramic powders, which are mixed with organic binders and a solvent, cast, and cut to form ~~[[the]]~~ a tape, ~~[[the]]~~ and
wherein layers having of the stacked assembly have a pair of major surfaces.

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13. (Withdrawn) The method of claim 11, further comprising the step of fabricating a conductor junction by a process selected from the group consisting essentially of a screen printing process, ~~evaporating an evaporation process~~, and a sputtering process.

14. (Withdrawn) The method of claim 11, further comprising the step of joining ~~[[the]]~~ layers of the stacked assembly by a ~~method~~ process selected from the group consisting essentially of an epoxying process, a brazing process, and a soldering process.

15. (Withdrawn) The method of claim 11, further comprising the step of punching holes in the one or more green sheets to ~~[[hold]]~~ accommodate electrically conductive vias for connecting the conductor junction.

16. (Withdrawn) The method of claim 11, further comprising the step of punching holes in the one or more green sheets to ~~[[hold]]~~ accommodate thermally conductive vias for dissipating heat from the ~~internal layers~~ stacked assembly.

17. (Withdrawn) The method of claim 11, further comprising the step of providing a resistive termination to form an isolator.

18. (Withdrawn) The method of claim 11, further comprising the step of providing at least one well to house the at least one magnet after cofiring.